Northeastern Area State & Private Forestry

P-70-2

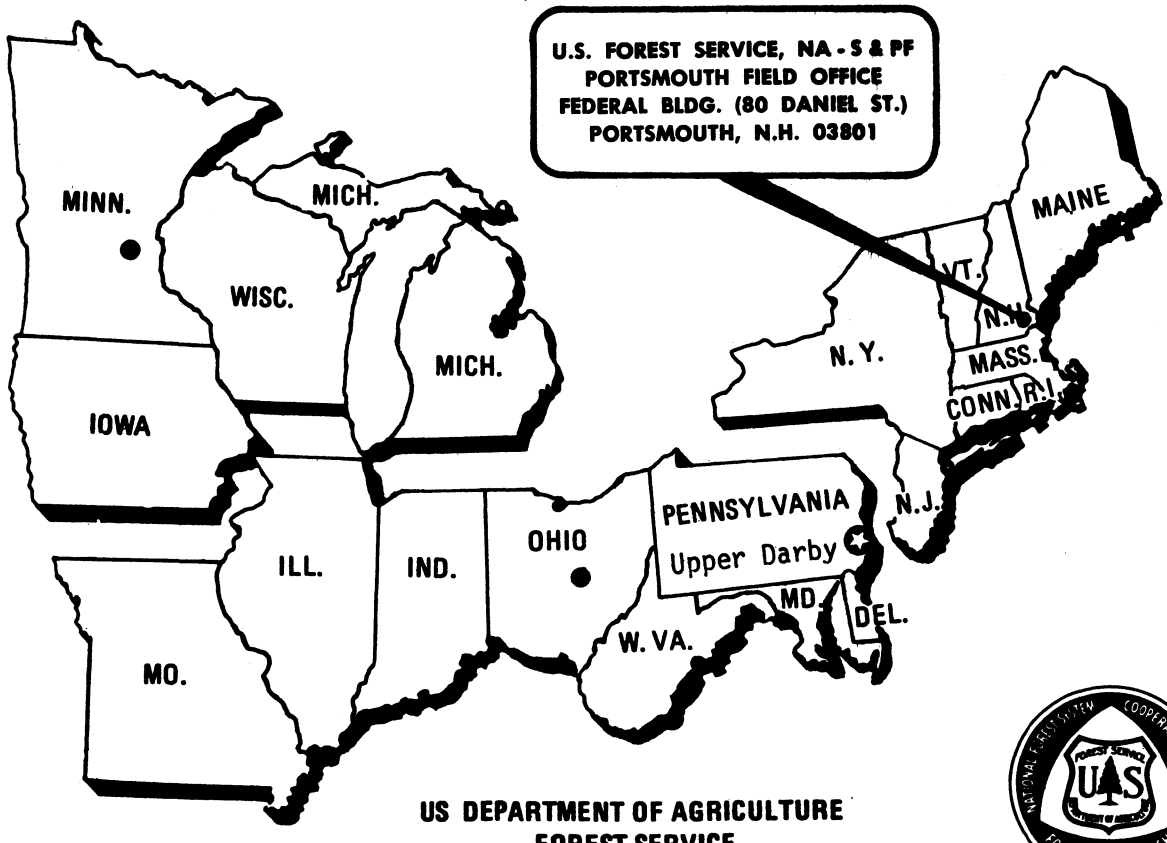
5230

GYPSY MOTH EGG MASS SURVEY

PICATINNY ARSENAL

Robert P. Ford

December 1970



US DEPARTMENT OF AGRICULTURE
FOREST SERVICE

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ABSTRACT

A survey for Gypsy moth egg masses on the Picatinny Arsenal indicates a potential for heavy to severe defoliation of about 1000 acres of mixed oak forest in 1971. Another 2000 acres will likely be defoliated to a lesser degree. Many natural control agents are established, but they are not likely to suppress the outbreak next year. The outbreak is threatening forest values on the Arsenal, and is causing a break in the Agricultural Research Service quarantine program.

INTRODUCTION

John Bozzuffi, Arsenal Management Agronomist, and Robert P. Ford, Forest Service Entomologist, conducted a Gypsy moth egg mass survey on October 13, 14 and 15, 1970. The purpose of the survey was to predict the potential for defoliation on the Picatinny Arsenal in 1971. A similar survey conducted in 1969 indicated an upward trend in the Gypsy moth population.* Defoliation of 80-100% occurred on 800 untreated acres in 1970.** (Map I) An adjacent 200 acres of the Arsenal was treated with 1 pound of Carbaryl per acre by Agricultural Research Service. (Map I)

SURVEY METHOD

Scouting was combined with 20 plots to estimate the number of egg masses per acre. Only a few plots were established in this case because Agricultural Research Service and Picatinny Arsenal personnel had reached a decision to spray but wanted additional information on the Gypsy Moth infestation.

Each plot was paced off in a square and consisted of one-tenth acre. Plots were distributed as follows:

LOCATION	NUMBER	SYMBOL
Sprayed Area (1970)	2	S
Defoliated Area	4	D
Edge of Defoliated Area	3	E
Other Areas	11	N

Locations and symbols are given on Map II.

Each plot was examined carefully for egg masses. Notes were taken on tree species and size, basal area, type and density of underbrush, egg mass size, and indication of parasite presence and their effectiveness. A reconnaissance was made around each plot to make sure it was typical of the area in forest type and egg mass density.

Scouting consisted of casual searching for egg masses and parasite damage to eggs and pupae. This technique was used frequently between the plots in order to determine whether the infestation was general or spotty.

The survey method employed, has been used for over 20 years by pest control people who were involved in Gypsy moth work.

RESULTS OF SURVEY ***

Sprayed Area	-	No egg masses were found in either plot in the area treated in 1970. No egg masses were seen during scouting.
Defoliated Area	-	Each of the 4 plots indicated that there were more than 1,000 egg masses per acre in the area severely defoliated in 1970. Egg masses contained 250 to 400 eggs.
Edge of Defoliated Area	-	Plots E-1 and E-2 (Map II) showed the eastern edge to be infested with 1000 to 2000 egg masses per acre. The median egg mass contained about 400 eggs. Only 20 egg masses per acre were indicated by Plot E-3. These contained about 300 eggs each.
Other Areas	-	No egg masses were found in and around Plots N-5, N-6, N-8, or N-11. High counts of egg masses (500 to 1000 per acre) were found on plots N-1, N-2, and N-4. Egg mass size varied considerably. About 30% of the egg masses on Plot N-2 were "spatters" (20-50 eggs each), while others were extra large (450 eggs each). On Plot N-1, the median egg mass contained about 300 eggs. On Plot N-4, egg counts varied from 200 to 400 per egg mass with the larger number predominant.

A medium count (180 per acre) of egg masses was found in and around Plot N-3. These contained about 300 eggs each.

Low counts of egg masses were found on Plot N-7 (60 per acre), N-9 (50 per acre) and N-10 (25 per acre). In each case, the average egg mass contained over 300 eggs.

TECHNICAL INFORMATION

Causal Agent

Gypsy Moth, *Porthetria dispar* (L.)

Host Trees

Red, White, Black and Chestnut Oak (*Quercus* sp.), Birch (*Betula* spp.), Hickory (*Carya* spp.) Maple (*Acer* spp.), and Dogwood (*Cornus florida*).

Type of Damage

No tree mortality from the first year of severe defoliation was detected at the time of the survey. *Armillaria* root rot is usually present in the soil, and under conditions of tree stress can readily invade and kill trees. Evidence of this disease may be visible next summer (1971).

Ecological Factors

Most sites on the Arsenal are ideal for Gypsy Moth because they are dry, rocky, and support host trees.

Gypsy moth disperses as a first instar larva by spinning a thread then drifting with the wind. High populations of Gypsy moth are located north and west of the Arsenal. In this situation, the larvae can readily disperse into and out of the Arsenal.

Parasites and virus disease are active in the infestation. The egg parasite, *Ooencyrtus kuwani*, was seen as an adult and evidence of its presence was also common in egg masses from which it had emerged. This insect varied from very light to heavy (up to 20% of host eggs parasitised) throughout the infestation. The higher degree of parasitization was in the defoliated area.

The plots outside the defoliated area were relatively free of parasites other than O. kuwani. Only an occasional pupa had been killed by virus (wilt) or by fungus. One first generation Apanteles sp. was found.

Parasites killed 30%, 54%, and 59% of the pupae on the three plots within the defoliated area. Examination of killed pupae revealed 3 major parasites, and some minor mortality caused by a fungus. Approximately one-third of the dead pupae appeared to have been attacked by Brachymeria intermedia. About one-quarter of the dead pupae succumbed to wilt disease. Most of the remaining dead pupae were killed by Sturmia scutellata flies. Smaller numbers were killed by ground beetles and other parasites. This is an unusual case of rapid build-up of parasites.

Wilt disease was not evident in the larvae of the Gypsy moth, but it did kill large numbers of pupae and emerging moths.

Starvation was also evident in the defoliated area. Pupae were small and some catepillars had died in the 5th instar.

Extent of Outbreak and Location

A heavy infestation extends over approximately 1000 acres of the Arsenal. This infestation is between the northwest boundary and the west shores of Lake Denmark and Picatinny Lake. (Map II). An additional 2000 acres is lightly to moderately infested by Gypsy moth. This lighter infestation is spotty throughout the remaining woodlands of the Arsenal except for the area north of the power line near Lake Denmark (Map II). Heavy to severe defoliation by Gypsy moth occurred on private land to the northwest of the Arsenal. Moderate defoliation in 1970 also occurred to the north of the sprayed area (Map I).

CONCLUSION

The egg mass survey indicates that there is a potential for defoliation by Gypsy moth on the Picatinny Arsenal in 1971. Over 1000 acres are likely to be severely defoliated in the northwest portion of the woodland. An additional 2000 acres will probably be moderately defoliated (Map II). The area sprayed in 1970 could also be defoliated if winds carry larvae in from nearby heavy infestations.

DISCUSSION

The Gypsy moth population has increased in size and extent during the past year. Larvae blown in from the infested area to the north and west have added considerably to the infestation. Stress on the population is significant only in the center of the 800 acres defoliated in 1970. This stress is chiefly starvation and pupal parasites.

If the Arsenal is not chemically treated to suppress Gypsy moth, at least two more years of severe defoliation can be expected before natural factors control the infestation.

In addition to providing for wildlife, timber harvesting, recreation, and water flow control, the woodlands on the Arsenal are needed for noise abatement, and to reduce fire hazard and damage from accidental munitions explosion.

The frequent shipment of materials from the Arsenal to other parts of the world is an avenue for long distance spread of the Gypsy moth. This danger was realized in 1970 when California intercepted such material which was infested with egg masses. The Gypsy moth quarantine will not work when this happens.

Water resources, wildlife, and timber values would be temporarily reduced in quality and quantity to a small degree if the Gypsy moth infestation was allowed to run its course. The other values - reduction of fire hazard, noise abatement, and prevention of long-range spread of Gypsy moth are of higher priority on the Picatinny Arsenal.

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* Ford, Robert P., November 1969. Gypsy moth egg mass survey, Picatinny Arsenal. Report A-69-10, File 5230 NA-S&PF, Div of Forest Pest Control. Amherst, Mass. 5pp

** Defoliation was determined in an aerial survey by John Kegg, N.J. Dept. of Agriculture.

*** Field Data sheets on file at Portsmouth Field Office, U.S.F.S., 80 Daniel St., Portsmouth, New Hampshire 03801

MAP I

PICATINNY ARSENAL

DOVER, NEW JERSEY

1967

SCALE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

Heavy Defoliation

Severe Defoliation

Severe Defoliation

800 Acres

200 Acres Sprayed 1970

50 Acres Moderate Defoliation

PICATINNY LAKE

DENMARK LAKE

ROUTE 15

5 LANES

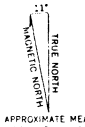
INTERSTATE ROUTE 80 6 LANES

DOVER 2 MILES

GYPSY MOTH DEFOLIATION 1970 *

LEGEND

- RESERVATION BOUNDARY
- MEDIUM-LIGHT DUTY ROADS
- UNIMPROVED ROADS
- RAILROAD
- POWER LINE
- DEFOLIATION BOUNDARY



APPROXIMATE MEAN DECLINATION, 1954

* From Survey by John Kegg, N.J. Dep't. of Agri.

MGC

PICATINNY ARSENAL

MAP II

DOVER, NEW JERSEY

1967

SCALE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

S2

S1

D3

DENMARK LAKE

D2

E1

N1

N2

Line of Potentially Severe Defoliation 1971

E2

D1

N4

N3

D4

E3

PICATINNY LAKE

N5

N7

GYPSY MOTH EGG MASS SURVEY 1970

ROUTE 15 5 LANES

N11

N6

N10

N8

N9

INTERSTATE ROUTE 80 6 LANES

DOVER 2 MILES

LEGEND

RESERVATION BOUNDARY

MEDIUM-LIGHT DUTY ROADS

UNIMPROVED ROADS

RAILROAD

POWER LINE

S Sprayed 1970

D Defoliated 1970

E Edge of Defoliation

N Not Defoliated

• Plot

BOUNDARY OF POTENTIALLY SEVERE DEFOLIATION - 1971

TRUE NORTH

MAGNETIC NORTH

APPROXIMATE MEAN DECLINATION, 1954

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